REMARKS

Applicants would like to thank the Examiner for the thorough examination of the present application.

The independent claims have been amended to more clearly define the present invention over the cited prior art references. Support may be found in paragraph 24 of the Applicants' specification. In addition, the preamble in all of the dependent claims has been amended as helpfully suggested by the Examiner. The claim amendments and arguments supporting patentability of the claims are provided below.

I. The Amended Claims

The present invention, as recited in amended independent Claim 14, for example, is directed to an image sensor comprising an array of pixels, each pixel comprising a photodiode, and first and second output circuits. The first output circuit derives a linear output signal by applying a reset signal to the photodiode, and reads a voltage on the photodiode after an integration time. The second output circuit derives a logarithmic output signal by reading a near instantaneous illumination-dependent voltage on the photodiode that is a logarithmic function of the illumination. The first and second output circuits sequentially provide the linear and logarithmic output signals. An output selection circuit selects between the linear output signal and the logarithmic output signal as an output signal, with the linear output signal being selected when greater than a predetermined value.

Amended independent Claim 21 is directed to an image

sensor, and has been amended similar to independent Claim 13.

Amended independent Claim 31 is directed to a method for operating an image sensor, and has been amended similar to independent Claim 13.

II. The Claims Are Patentable

The Examiner rejected independent Claims 14, 21 and 31 over the article by Tu et al., titled "CMOS Active Pixel Image Sensor With Combined Linear And Logarithmic Mode Operation." In the Tu et al. article, the Examiner referenced FIGS. 2a, 2b as disclosing the photodiode, and FIG. 2a as disclosing the first output circuit and FIG. 2b as disclosing the second output circuit. The first output circuit is directed to an integration linear mode, and the second output circuit is directed to a logarithmic mode. Reference is directed to the second paragraph in the Introduction Section in column 1 of the Tu et al. article, which provides:

> "The pixel can be operated in either a linear integration mode or a logarithmic mode. ... Our design incorporates both modes of operation which can be selected by a control signal according to different applications." (Emphasis added).

In sharp contrast, independent Claim 14 has been amended to recite that first and second output circuits sequentially provide the linear and logarithmic output signals, and an output selection circuit selects between the linear output signal and the logarithmic output signal as an output signal,

with the linear output signal being selected when greater than a predetermined value.

In other words, a frame of image data will have the information for some pixels gathered from the integrating (linear) mode and other pixels from the logarithmic mode. The pixels that have saturated during exposure will have a log value. This advantageously provides performance of the integrating (linear) mode in low light conditions, but adds the high dynamic range of the logarithmic mode.

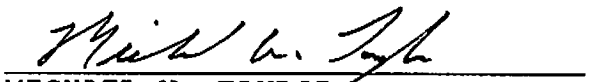
In the Tu et al. article, a control signal is used to select between the integrating (linear) mode and the logarithmic mode. Tu et al. fails to disclose that the linear and logarithmic output signals are sequentially provided by the first and second output circuits. Tu et al. also fails to disclose an output selection circuit for selecting between the linear output signal and the logarithmic output signal as an output signal, with the linear output signal being selected when greater than a predetermined value. Instead, the control signal in Tu et al. determines ahead of time which mode is to provide the output signal.

Accordingly, it is submitted that amended independent Claim 14 is patentable over the Tu et al. article. Amended independent Claims 21 and 31 are similar to amended independent Claim 14. Therefore, it is submitted that these claims are also patentable over the Tu et al. article.

In view of the patentability of amended independent Claims 14, 21 and 31, it is submitted that the dependent claims, which include yet further distinguishing features of the

invention are also patentable. These dependent claims need no further discussion herein.

Respectfully submitted,



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